Global warming will bring more forest fires all over the Earth

by Ed Berg

Poet Robert Frost observed that, "Some say the world will end in fire, some say in ice…" Last month I attended the 3rd International Fire Ecology and Management Congress in San Diego where opinions were definitely of the fire persuasion. Ice didn't stand a chance.

Ruben Grijalva, chief fire marshal of California, described how the fire season in California now begins in January and runs into December because the formerly cool winters have grown so much warmer. Arson has gotten worse, for sure, but warmer winters provide drier fuels for the arsonists.

Fire researcher Mike Flannigan of the Canadian Forest Service, described the increasing frequency of big fire years in the northern boreal forests. In northern forests most acreage is burned episodically in really large fires, which occur in years with hot summers, such as 2004 and 2005 in the Yukon and Alaska. In the last several decades hot summers and big fire years have become more frequent throughout Canada, Alaska, and Siberia.

Warm summers have also increased spruce bark beetle outbreaks, as we well know from the warm 1990s on the Kenai. The net affect of more fire and more bug kill is that since the early 1990s the Canadian boreal forest is no longer a carbon "sink," or storehouse, but is now a carbon source, i.e., the forest is now losing carbon dioxide to the atmosphere. This creates a nasty positive feedback loop, because adding more CO_2 to the atmosphere makes the atmosphere warmer, which causes more fire and bug kill, which makes the forest give up more CO_2, which makes the atmosphere still warmer, and so on. Such a positive feedback loop doesn't necessarily mean that the world will end in fire, but it could mean that the world will run out of forests.

One of the liveliest speakers was Professor Richard Alley from Penn State University. Alley is a leading researcher of the 110,000 year-by-year climate history recorded in ice cores taken from the Greenland icecap. In these cores Alley found evidence of more than a dozen rapid climate change events, where the climate changed by as much as 10°F in less than a decade. The last such event was 8200 years ago. These rapid warmings occurred when the northerly flow of the Atlantic Gulfstream was disrupted, and heat accumulated in the southern latitudes. These stoppages of the ocean heat conveyor belt warmed the southern latitudes but froze out Europe. (The conveyor belt stops when too much fresh water is dumped in the cold North Atlantic and the very salty Gulfstream water cannot sink and flow back south along the ocean floor.) Recent studies have found the North Atlantic freshening with meltwater from the Greenland icecap, so the possibility of such a disruption is not simply an academic theory.

Scripps oceanographer Tim Barnett described the increasing acidity of the oceans as seawater absorbs more CO_2. The oceans are the Earth's largest CO_2 reservoir, holding 50 times more CO_2 than the atmosphere and 20 times more than the terrestrial biosphere. Acidic seawater is starting to dissolve coral reefs, shellfish, and plankton with calcareous shells. Barnett showed photos of single-cell plankton whose shells were heavily etched and thinned by acidic marine waters. Some of these plankton take up CO_2 for photosynthesis and are important parts of the ocean food chain; their loss will likely reduce marine fish populations.

Several speakers expressed concern that the widely publicized global climate change models do not account for the kind of rapid temperature changes that Richard Alley observed in the Greenland cores. These models for example forecast a gradual 4-5°F rise for south-central Alaska in the next 100 years, but they have no mechanism for predicting the kind of rapid changes brought on by a disruption of the Gulfstream, releases of large amounts of methane from melting permafrost, or breaking off a large chunk of the Antarctic iceshelf. The models are thus conservative, and climate warming could be much more sudden and severe than predicted.

I'll admit that I was surprised to see the interest in climate change dominating this international conference, which mostly drew attendees from the Lower-48,

and southern countries like Mexico, Brazil, Australia and South Africa. Climate change effects are well-known to most Alaskans, but among the researchers and managers of fire south of Alaska climate warming appears to be a tangible and recognized fact of life, if one can judge by this conference.

There were more than 625 talks and posters at this conference, organized into ten simultaneous tracks. Most of the talks were much more specific and local than the global talks described above. I gave two talks—one summarizing our many years of fire history studies on the Kenai Refuge, and the other on landscape drying, spruce bark beetles and fire regimes on the Kenai. I have short summaries of these talks which I can send interested readers by e-mail or post upon request (edward_berg@fws.gov, 260-2812).

The general theme coming through these talks was that we will see a lot more fire on the landscape in coming decades, all over the planet. Global warming has many costs, and wildfire won't be one of the cheaper ones.

Ed Berg has been the ecologist at the Kenai National Wildlife Refuge since 1993. Ed will teach his one-credit course on Global Climate Change at the Kenai Peninsula College in Soldotna and Homer, beginning Feb 27 and Mar 1, respectively. Previous Refuge Notebook columns can be viewed on the Web at http://www.fws.gov/refuge/kenai/.